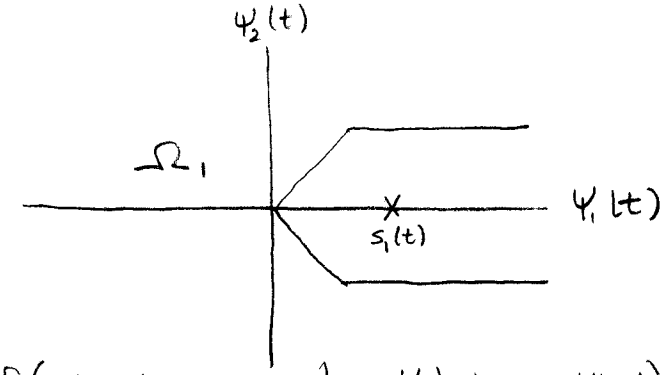
ECE4304-C07 HW4 HINT 7-Feb-2007

In problem 4(c), you are asked to compute the probability of a correct symbol decision given that $s_1(t)$ was transmitted

$$P(\text{correct} \mid s_1(t) \text{ transmitted})$$

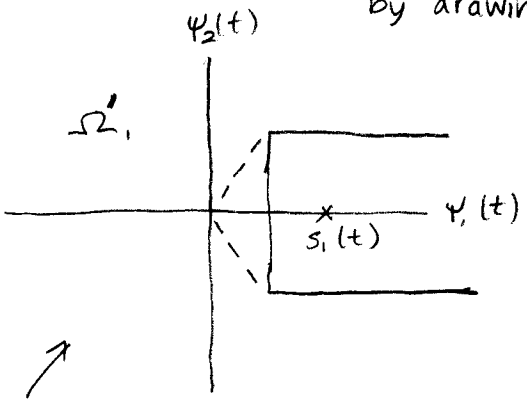
$$= P(\underline{v} \text{ not in } \Omega_1 \mid s_1(t) \text{ transmitted})$$

The decision region for $s_1(t)$ looks something like this



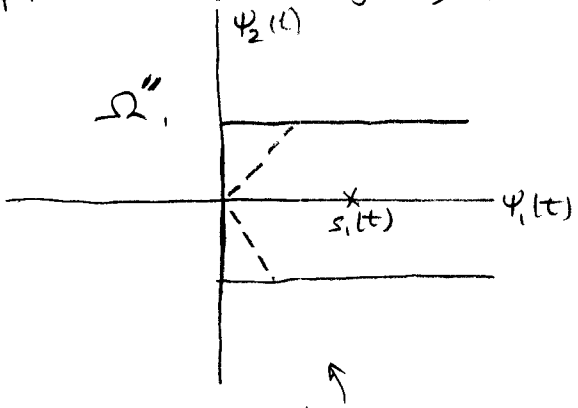
Expressing $P(\underline{v} \text{ not in } \Omega_1 \mid s_1(t) \text{ transmitted})$ in Q-functions may not be possible here because this is not a rectangular region

Instead, please calculate two bounds for this probability by drawing appropriate rectangular regions, i.e.



in this case

$P(\underline{v} \text{ not in } \Omega_1' \mid s_1(t) \text{ transmitted}) <$
$P(\underline{v} \text{ not in } \Omega_1 \mid s_1(t) \text{ transmitted})$



here

$P(\underline{v} \text{ not in } \Omega_1'' \mid s_1(t) \text{ transmitted})$
$> P(\underline{v} \text{ not in } \Omega_1 \mid s_1(t) \text{ transmitted})$

The actual probability will fall somewhere between these two bounds.

You can express these bounded probabilities as Q-functions.

Note: You should be able to compute $P(\text{correct} \mid s_2(t) \text{ sent})$ in problem 4(d) without the use of bounds